

# BIOS 2034 PRINCIPLES OF EVOLUTION

**Credit Points** 10

**Legacy Code** 300980

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**Description** This unit is designed to impart an understanding of the core concepts in modern evolutionary theory, and an appreciation of the central position it plays in unifying all sub-disciplines of biology. The unit will cover modern synthesis, phylogenetics, phylogeography, origin of variation, genetic drift, natural selection, and coevolution, with a major emphasis on evolutionary mechanisms and analytical techniques.

**School** Science

**Discipline** Ecology and Evolution

**Student Contribution Band** HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Undergraduate Level 2 subject

**Pre-requisite(s)** BIOS 1001 AND BIOS 1012

## Learning Outcomes

On successful completion of this subject, students should be able to:

1. Define evolution and provide supporting evidence
2. Explain the concepts of natural selection, biological adaptation and speciation
3. Assess the relative importance of neutral and selective processes in population divergence and speciation
4. Determine the direction and strength of migration, and the origin of genetic variation
5. Construct and interpret evolutionary phylogenies according to the concepts of common ancestry and parsimony of derived characters
6. Test the importance of interactions in driving trait shifts in a geographic context
7. Critically assess and interpret scientific literature, and advances in the field of research
8. Design, execute, analyse and interpret scientific experiments
9. Communicate the findings of investigations and experiments in oral and written form
10. Analyse the application of evolutionary theory to many modern issues, including (but not limited to) infectious disease, human behaviour, and genetic engineering

## Subject Content

This subject provides a framework for understanding the concepts of evolutionary biology. It offers an overview of the subject by focusing on the nature of species and how they interact in ecological systems to drive evolutionary change. Students will examine evolutionary theory and supporting evidence from the fossil record, embryonic development, to DNA. Techniques in inferring phylogenetic relationships, estimating divergence times, trait evolution and origin of variation will be applied. Other subjects to be discussed include the

role of biodiversity, development, evolution of sex, cooperation and behaviour, infectious disease, coevolution and human evolution. The subject will have four major topics following the selected textbook, which will be taught over 3 weeks (delivery online modules & quizzes, 3 x 2hr lecture, 1-2 lab/workshop) with 3-4 concepts to explore where specific techniques and examples will be demonstrated/provided.

1. Foundations of Evolutionary Biology
  - An Overview of evolutionary biology
  - Darwin and natural selection
  - Phylogeny and evolutionary history
2. Evolutionary Genetics
  - sources of Genetic variation
  - The Genetics of populations
  - quantitative Genetics
  - Genome evolution
3. The History of Life
  - The origin and evolution of life
  - major transitions
  - evolution and development
  - species and Speciation
4. Adaptations
  - The evolution of sex
  - sexual selection
  - The evolution of Sociality
  - coevolution

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Item	Length	Percent	Threshold	Individual/ Group Task
Mid-term Online tests - 4 online multiple choice tests through vUWS (5% each test)	1 hour (open book and done in own time)	20	N	Individual
Critical review of published article	5min and questions	10	N	Individual
Practical assessment - Short answer in class assessment	200 words	10	N	Individual
Scientific Report	2,000 words	20	N	Individual
Final Exam - combination of multiple choice and short answer questions	2 hours	40	N	Individual

Prescribed Texts

- Bergstrom, C T & Dugatkin, L A, 2012, Evolution, Norton, New York.

Teaching Periods